Australian innovations of health services and economic evaluation of bone-anchored prosthesis using osseointegration

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Frossard L, Berg D. *Australian innovations of health services and economic evaluation of bone-anchored prosthesis using osseointegration*. AOPA Conference. 2017. Melbourne, Australia

Speaker's information

Dr Laurent Frossard is currently an Adjunct Professor at the Queensland University of Technology (QUT) and University of Sunshine Coast (USC) as well as the Director/Chief Scientist Officer at YourResearchProject.

He is a Biomechanist focusing on the locomotion and rehabilitation of individuals with lower limb loss. He is one of the very few independent experts in the clinical benefits of bone-anchored prostheses.

His academic track record includes over 140 publications, several grants, supervisions of students and international collaborations.

Background

Most of functional issues associated with socket experienced by individuals with lower limb amputation can be overcome by surgical implantation of osseointegrated fixation enabling bone-anchored prosthesis (BAP). [1-31]

Governmental organizations are facing challenges in adjusting procedures to accommodate the emergence of BAP.[32-35]

Aim

This study shares the knowledge gained and innovations developed by the Queensland Artificial Limb Service (QALS), an Australian State government organization, while implementing a procedure for fair and equitable provision of care with BAP. [35-37]

Method

The three innovations presented here emerged from a 3-year project of research following typical phases of action research led by QALS' management team and researchers who consulted key stakeholders (e.g., 18 Queensland-based consumers, 3 prosthetists, 2 multidisciplinary clinical teams).

Innovation 1: Policy for provision of BAP

The study indicated that:

- The provision of BAP can be achieved relying on 7 processes involving fixed expenses during the treatment and 5 processes regulating ongoing prosthetic care expenses.[37]
- Prosthetic care required 22 hours of labor corresponding to $3,300 per patient during rehabilitation. Prosthetists spend 64% of their time focusing on prosthetic care.[37]

Table 1: Cost breakdown of Prosthetic Service Provider (PSP) labour ($150 per hour) included in the schedule of allowable fixed expenses in QALS' procedure to provide prosthetic services and components to consumers fitted with bone-anchored prostheses (Source: *Frossard, L., G. Merlo, T. Quincey, B. Burkett, and D. Berg, Development of a Procedure for the Government Provision of Bone-Anchored Prosthesis Using Osseointegration in Australia. PharmacoEconomics - Open, 2017: p. 1-6*)[37]

Treatment stage	Procedure phase	Items		Timeline (months)	Cost of PSP labour	
		ID	Intervention		h	$
Preoperative	P1	P1-A	Screening consultation	−3.0	2.0	300
Preoperative	P1	P1-B	Creation of passport	−2.0	0.5	75
Surgery	P2	P2-A	Consultation after surgeries	0.5	2.0	300
Surgery	P2	P2-B	Completion of passport	1.0	0.5	75
Rehabilitation	P3	P3-A	Pre-fitting of light limb	1.5	1.0	150
Rehabilitation	P3	P3-B	Fitting of light limb	2.0	4.0	600
Rehabilitation	P3	P3-C	Completion of passport	2.5	0.5	75
Rehabilitation	P4	P4-A	Pre-fitting of definitive limb	3.0	1.0	150
Rehabilitation	P4	P4-B	Fitting of definitive limb	3.5	10.0	1500
Rehabilitation	P4	P4-C	Completion of passport	4.0	0.5	75
Total fixed					22.0	3300

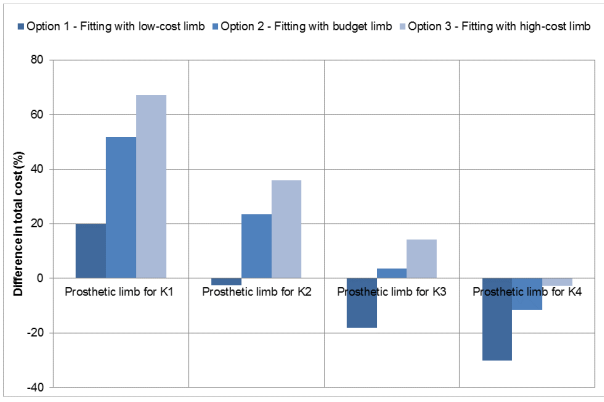
PSP Prosthetic Service Provider, *QALS* Queensland Artificial Limb Service

Innovation 2: Cost-comparison

The study revealed that:

- Labor and attachment costs were reduced by 18% and 79% for all BAP options compared with any socket fitting, respectively.[35]
- BAP was more economical by $18,200, $7,000, and $1,600 when fitted with low-cost, budget, and high-cost options compared with sockets for K4, respectively.[35]

Figure 1: Differences in total costs over six-year funding cycle between each bone-anchored prosthesis and K-level socket fitting options expressed in percentage socket options (Source: *Frossard L, Berg D, Merlo G, Quincey T, Burkett B. Cost-comparison of socket-suspended and bone-anchored transfemoral prostheses. JPO: Journal of Prosthetics and Orthotics. 2017. (29) 4, p 1-11*)[35]

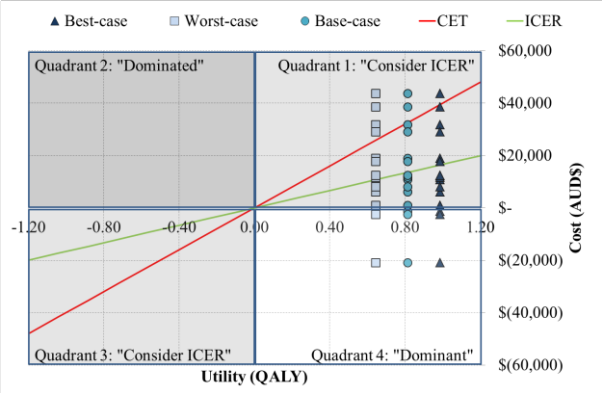


Innovation 3: Cost-effectiveness

The study showed that:

- The cost for provision of BAP was 21±41% more than socket-suspended prostheses.[36]
- The QALY increased by 17±5% after fitting with bone-anchored prostheses.[36]
- The ICER was $17,000 per QALY. BAP was cost-saving and cost-effective for 19% and 88% of the participants, respectively.[36]

Figure 2: Overview of cost-utility analysis using indicative ICER of $16,632 per QALY and cost-effectiveness threshold (CET) of $40,000 per QALY with quadrant for BAP more costly and more effective (1), more costly and less effective (2), less costly and less effective (3), less costly and more effective (4) than socket-suspended prosthesis (Source: *Frossard L, Merlo G, Burkett B, Quincey T, Berg D. Cost-effectiveness of bone-anchored prostheses using osseointegrated fixation: myth or reality? Prosthetics and Orthotics International. 2017*)[36]



To know more

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